UNIVERSITY OF ILLINOIS
Agricultural Experiment Station

SOIL REPORT No. 55

JACKSON COUNTY SOILS

By E. A. NORTON, R. S. SMITH, E. E. DeTURK, F. C. BAUER, and L. H. SMITH

URBANA, ILLINOIS, JUNE, 1933

"It must be remembered that the productive power of the soil is the basic support of all prosperity."

C. G. HOPKINS

"It is the duty of every landowner to see that his land when he leaves it is as good or better than when he received it."

J. G. MOSIER

STATE ADVISORY COMMITTEE ON SOIL INVESTIGATIONS

1932-1933

F. I. Mann, Gilman
N. F. Goodwin, Palestine
G. F. Tullock, Rockford
W. E. Riegel, Tolono
F. S. Haines, Geneseo

RESEARCH AND TEACHING STAFF IN SOILS

1932-1933

Herbert W. Mumford, Director of the Experiment Station
W. L. Burlison, Head of Agronomy Department

Soil Physics and Mapping

R. S. Smith, Chief
D. C. Wimer, Assistant Chief
E. A. Norton, Assistant Chief
R. S. Stauffer, Associate
D. C. Maxwell, First Assistant
Herman Wascher, First Assistant
Eric Winters, Jr., Assistant
G. D. Smith, Assistant

Soil Fertility and Analysis

E. E. DeTurk, Chief
F. H. Crane, Assistant Chief
R. H. Bray, Associate
J. C. Anderson, First Assistant
E. B. Earley, Assistant
K. B. Daniloff, Assistant
J. E. Gieseking, Assistant

Soil Experiment Fields

F. C. Bauer, Chief[1]
H. J. Snider, Assistant Chief
A. L. Lang, Assistant Chief
C. J. Badger, Associate
L. B. Miller, Associate
C. H. Farnham, Assistant
P. E. Johnson, Assistant

Soil Biology

O. H. Sears, Associate Chief
L. E. Allison, Assistant

Soils Extension

F. C. Bauer, Professor[1]
C. M. Linsley, Assistant Professor

Soil Survey Publications

L. H. Smith, Chief
F. W. Gault, Scientific Assistant
Nellie Boucher Smith, Editorial Assistant

[1]Engaged in Soils Extension as well as in Soil Experiment Fields.

INTRODUCTORY NOTE

IT IS A MATTER of common observation that soils vary tremendously in their productive power, depending upon their physical condition, their chemical composition, and their biological activities. For the most advantageous utilization of the land a definite knowledge of the existing kinds or types of soil is a first essential, and for any comprehensive plans for the improvement and the maintenance of our agricultural soils this knowledge is likewise necessary. It is the purpose of a soil survey to classify the various kinds of soil of a given area in such a manner as to permit definite characterization for description and for mapping. With the information that such a survey affords, every farmer or landowner of the surveyed area has at hand the basis for a rational system of improvement of his land. At the same time the Experiment Station is furnished an inventory of the soils of the state upon which intelligently to base plans for those fundamental investigations so necessary for solving the problems of practical soil improvement.

This county soil report is one of a series reporting the results of the soil survey which, when completed, will cover the state of Illinois. Each county report is intended to be as nearly complete in itself as it is practicable to make it, even at the expense of some repetition.

While the authors must assume the responsibility for the presentation of this report, it should be understood that the material for it represents the contribution of a considerable number of the present and former members of the Agronomy Department working in their respective lines of soil mapping, soil analysis, and experiment field investigation. In this connection special recognition is due Mr. D. C. Maxwell, who, as leader of the field party, was in direct charge of the mapping.

CONTENTS

JACKSON COUNTY SOILS

By E. A. NORTON, R. S. SMITH, E. E. DeTURK, F. C. BAUER, and L. H. SMITH[1]

GEOGRAPHICAL FEATURES OF JACKSON COUNTY

JACKSON COUNTY is located along Mississippi river in southwestern Illinois. It measures 24 miles north and south by about 28 miles east and west at the widest part. It is a medium-sized county, comprizing about 586 square miles. The population in 1930 was 35,680, about half of which was rural. Murphysboro, the county seat, and Carbondale are the two principal towns.

The region of Jackson county was settled very early in the nineteenth century. The site of Grand Tower was one of the earliest stopping places for flat-boats plying the Mississippi. County government was organized in 1816 and the county seat established at Brownsville. Fire destroyed the county buildings in 1843, at which time the county seat was moved to Murphysboro and located on land donated by Doctor John Logan. Clearing the dense woodland for farming purposes progressed rapidly in the county after 1830, and by 1850 nearly 25,000 acres were in cultivation.

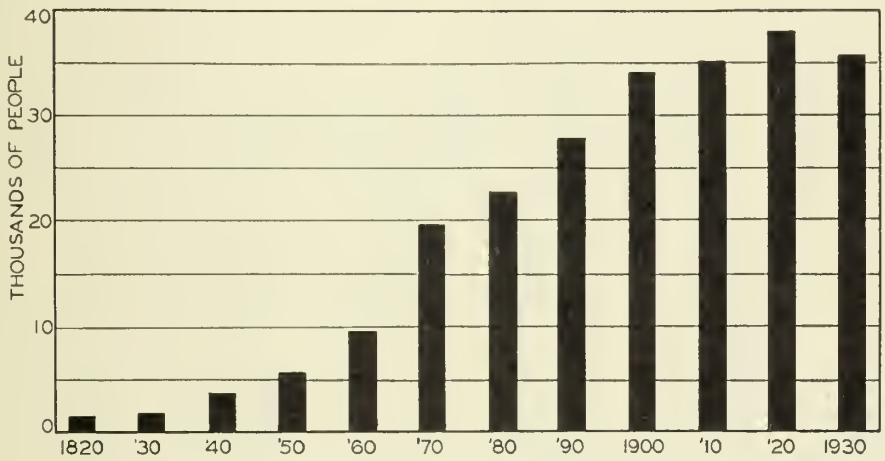


FIG. 1.—GROWTH IN POPULATION OF JACKSON COUNTY

The population of Jackson county grew steadily until 1920, when it reached its maximum. Since 1920 it has declined.

The population of Jackson county almost doubled every decade from 1830 to 1870, after which it increased more slowly. The maximum population was reached in 1920; during the next ten years there was a decline amounting to 3.8 percent (Fig. 1).

The facilities for marketing the agricultural products of Jackson county are well established. Three railroads give direct service to St. Louis and Chicago. These main-line railroads, with several branches, pierce every township in the

[1]E. A. NORTON, Assistant Chief in Soil Survey Mapping; R. S. SMITH, Chief in Soil Physics, in charge of identification and mapping of soil types; E. E. DeTURK, Chief in Soil Technology, in charge of soil analysis of the Soil Survey; F. C. BAUER, Chief in Soil Experiment Fields; L. H. SMITH, Chief, in Charge of Publications of the Soil Survey.

county, so that no farm is more than seven miles from a shipping point. All the principal towns in the county are joined by the state highway system of paved roads. Most of the secondary roads are dirt; only a few short stretches of cinder and gravel roads have been constructed. Many of the dirt roads have steep grades and in wet weather are impassable for automobiles. With the probable development of water transportation following the opening of the Lakes-to-Gulf waterway still another outlet is possible.

Agricultural Production

By 1900 nearly 54 percent of the land area in Jackson county had been improved for farming purposes. Since that time the acreage of improved land in farms has fluctuated between 50 and 60 percent. Abandoning of land because of erosion, poor drainage, and low productivity has increased at an alarming rate during the last ten years. The proportion of tenantry in Jackson county has never been large, varying around 30 percent.

The agriculture of Jackson county is well balanced with respect to diversification. Grain crops have continued from the earliest years to be the most im-

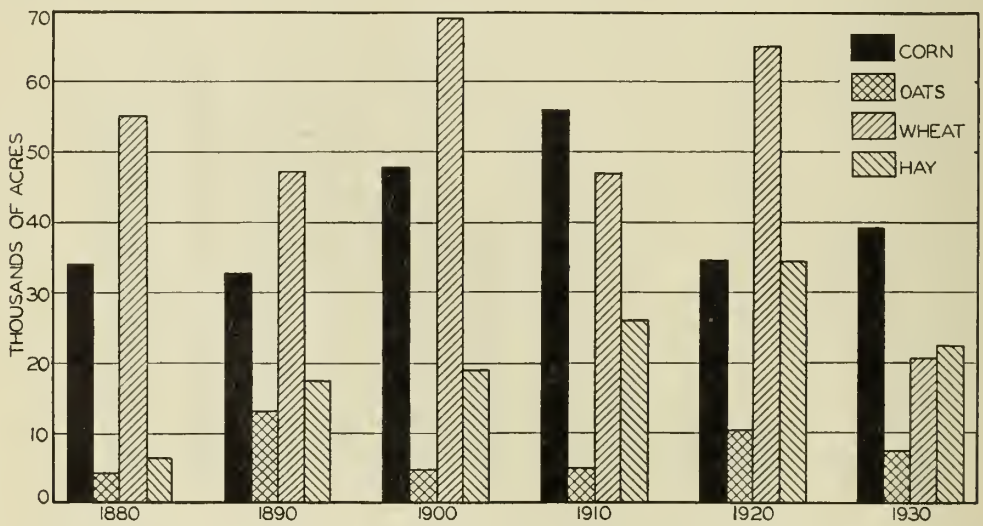


FIG. 2.—ACREAGE OF CORN, OATS, WHEAT, AND HAY IN JACKSON COUNTY

The diagram shows the relative acreage devoted to the principal crops at periodic intervals since 1880. (Figures from U. S. Census)

portant products raised. The livestock industry ranks second in importance, and the income received from the sale of fruits and vegetables is considerable.

The acreages devoted to the principal crops by decades from 1880 to 1930 are shown in Fig. 2. It will be noted that wheat and corn are the dominant crops, while oats are a minor crop so far as acreage is concerned. Certain livestock statistics are shown in Fig. 3. It will be noted that the number of horses and mules steadily increased until 1920, but has fallen off about 35 percent during the last decade. The number of hogs has steadily declined since 1890, when a maximum of about 34,000 was reached; today only about half that number are raised. The total number of all farm animals reached the maximum in 1890.

Poultry raising is an important source of income, the value of poultry and eggs produced in 1929 approximating half a million dollars. The number of chickens over three months old has varied from 130,000 to 200,000 during the last forty years.

Fruits and vegetable crops rank third in importance as a source of farm income in Jackson county. Peaches are the chief commercial fruit, 269 carloads having been shipped from the county in 1929, in addition to several thousands of bushels trucked out. In this same year 52 carloads of apples and 14 carloads of pears were shipped. There are more than a quarter of a million fruit trees in the county. Asparagus is the main vegetable crop of commercial importance, about 20 carloads being shipped each year.

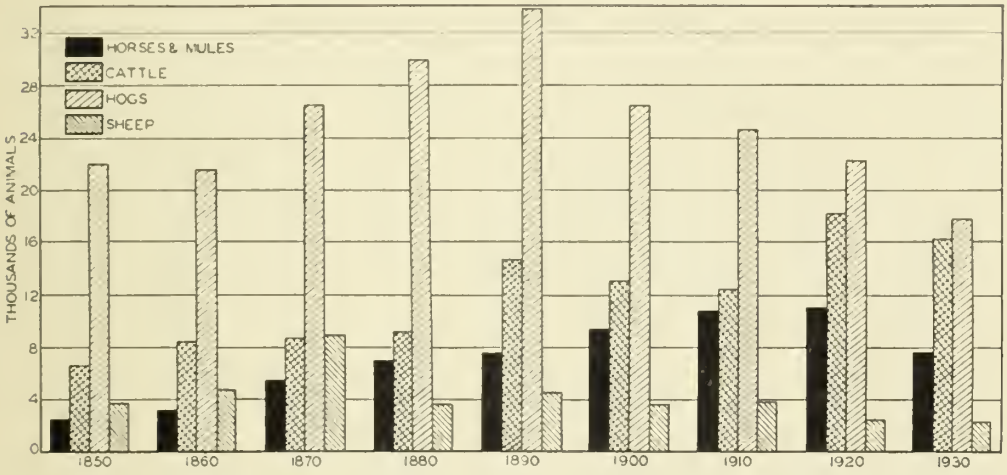


FIG. 3.—PRODUCTION OF PRINCIPAL CLASSES OF LIVESTOCK IN JACKSON COUNTY

The diagram shows the relative numbers of horses and mules, sheep, cattle, and hogs in Jackson county at periodic intervals since 1850. (Figures from U. S. Census)

Timber has constituted a considerable source of revenue in the past, but at present little that is marketable is left, most of the timber areas having been logged over several times. Most of the soils have a high capacity for producing wood crops, and the utilization of much of this land for timber purposes under systematic forestry management would be profitable.

Climate

The climate of Jackson county is typical of that prevailing in north-central United States. It is characterized by a wide range in temperature between the extremes of winter and summer and by an abundant rainfall. The highest temperature during the thirteen-year period from 1918 to 1931, as recorded at the U. S. Weather Bureau Station at Carbondale, was 113° F. in August, 1930; the lowest temperature was 19° below zero in January, 1930. The average yearly range of temperature is about 100 degrees. The mean summer temperature for this same period was 76.4°; the mean winter temperature, 38.2°; and the mean annual temperature, 57.8°. The average date of the last killing frost in the spring is April 17, and the earliest in the fall, October 22. The average length of grow-

ing season for this thirteen-year period was 188 days. The shortest growing season was 161 days in 1928, and the longest 204 days in 1924.

The average annual rainfall, as recorded at Carbondale for 1918 to 1931, was 43.66 inches. The annual rainfall has varied from a minimum of about 32 inches to a maximum of about 55 inches. The average monthly rainfall during the growing season thru this same period was slightly in excess of 4 inches, and this would appear to indicate good rainfall distribution in Jackson county. However, average rainfall figures are misleading in that departures from the average, as well as length of rainless periods, if less than a month in duration, are not shown. Moreover the rate of evaporation, character of the crop, and character of the soil with respect to its moisture absorptive and retentive capacities are all important factors influencing moisture conditions for plant growth.

No records are available showing the rate of precipitation, but much of the water falling during prolonged winter and spring rains and in hard, dashing showers in summer runs off the surface, making erosion a serious problem on rolling land and the accumulation of this water in amounts harmful to vegetation a problem on the flat land. Records show that during the seventeen-year period 1914 to 1931 there was an average of nearly four rainless periods of 11 days or more during each growing season. Rainless periods of this length are not ordinarily harmful on most soils unless preceded by a condition of moisture deficiency. However, each growing season had, as an average, two rainless periods exceeding 21 days in length, and there were seven rainless periods of 50 days or more during the seventeen years. These extended rainless periods seriously affect crop growth on all soils, and they can be expected to occur nearly every other year in Jackson county. (In the above described study, a rainfall of .5 of an inch or more was interpreted as breaking a rainless period.)

The character of the soils and the topography of Jackson county are such as to intensify unfavorable growing conditions resulting from adverse weather. The soils are generally low in organic matter and consequently have a low water-holding capacity. Soils on the rolling uplands lose much of the rainfall by run-off. The water table in the rolling uplands is so deep as to be of little, if any, value as a source of capillary water during extended rainless periods. The upland soils on nearly level and intermediate topography have a very compact, plastic, and slowly pervious subsoil which impedes water movement. The surface soil soon becomes saturated and, because the downward movement of water thru the clay-pan subsoil is very slow, a water-logged condition results. During rainless periods the surface soil dries and capillary movement of water from below is practically shut off by the slowly pervious subsoil. Thus are the ill effects of both wet periods and drouth periods intensified by the soil conditions which prevail in the region.

Physiography and Drainage

Jackson county is a region of considerable relief. Its altitude varies from 330 to 850 feet above sea level. The rugged, hilly area along the Mississippi river bluff and in the southern part of the county has many steep, rocky slopes 100 to 300 feet high. Erosion has dissected this area until now only a few very narrow ridges remain. The northeastern portion of the county is comparatively level.

Fig. 4 shows the general topographic situation and other physiographic features of the county.

The natural drainage in the rolling to rough upland in Jackson county (Fig. 4) is so well developed that the rapid run-off results in serious soil erosion. Because of the rapid run-off, small streams in this region flood their bottom lands after heavy rains, but the water soon gets away and the stream channels are dry most

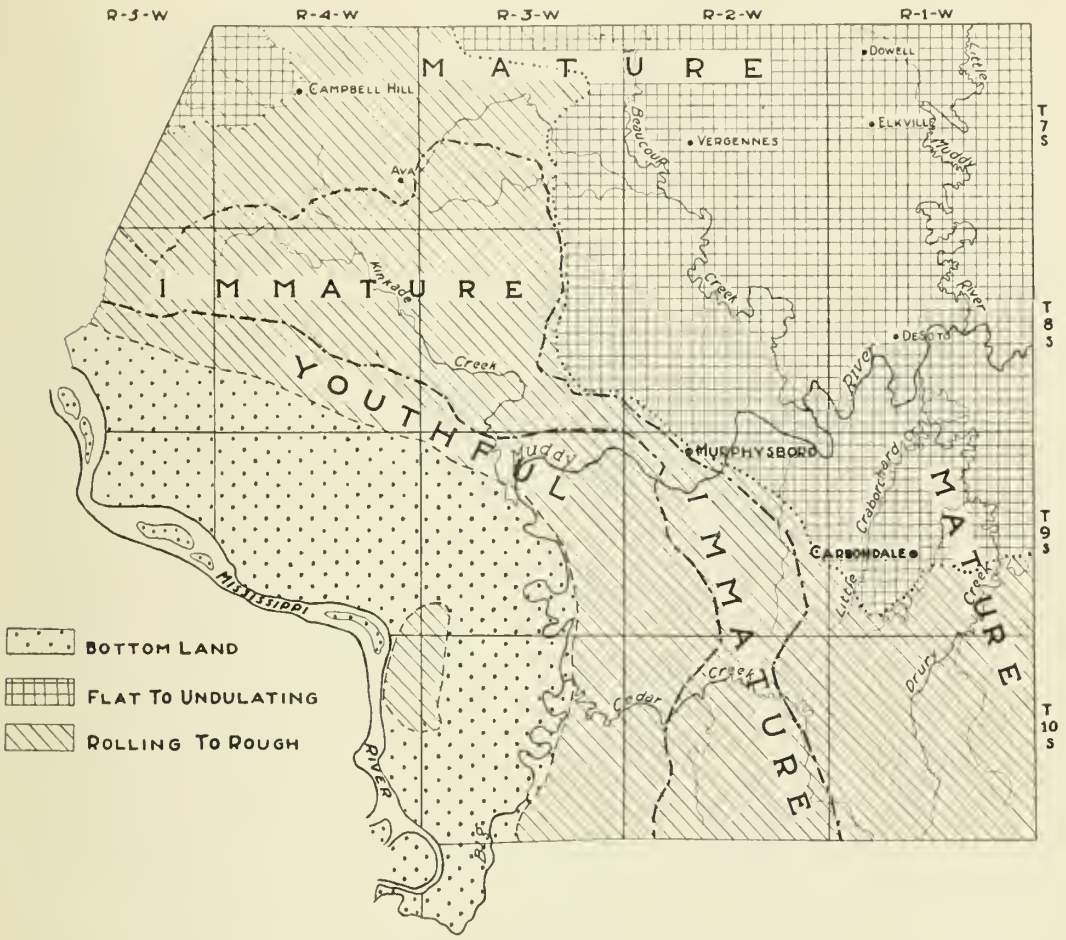


FIG. 4.—GENERAL SOIL REGIONS OF JACKSON COUNTY

In addition to indicating the maturity of the soils in different parts of Jackson county, the above map shows drainage lines and topographic provinces.

of the time. Even tho drainage channels penetrate the flat to undulating upland in all sections, it is not well drained because the land does not have sufficient slope for surface water to drain away readily and the subsoils are too slowly pervious for the water to drain thru them.

Jackson county drains into the Mississippi river principally thru Big Muddy river, whose main tributaries are Little Muddy river, and Beaucoup, Kinkade, Cedar, and Drury creeks. A few small creeks in the western part of the county empty directly into the Mississippi. The broad, flat bottom lands along the major streams, particularly along Big Muddy, are naturally poorly drained. They are

frequently flooded and are often covered with water until early summer. A few areas are permanently swampy. Attempts have been made to drain some of this land by dredging, but because of the extreme heaviness of the soil such attempts have failed. An outstanding example of this is a tract of 15,000 acres lying between Fountain Bluff and Big Muddy river, most of which is now being allowed to reforest itself naturally.

FORMATION OF JACKSON COUNTY SOILS

Origin of Soil Material

The nature of Jackson county soils can be more readily understood by a knowledge of the material from which they were derived. The bed rock which outcrops in many places in Jackson county was well dissected by erosion prior to being buried by the material from which the present soils were developed. The vigor of the erosion that occurred in this region was increased by a disturbance within the earth which arched up a portion of southern Illinois, forming what is known as the Ozark Highlands. The fact that the southern part of Jackson county was included in this earth movement accounts for its rough, hilly nature. A change in regional climate brought this prolonged period of erosion to a close and ushered in another geological age known as the Glacial epoch. It was during this epoch that the material that later formed the mineral portion of the soils as they now exist was deposited.

The climate during this Glacial epoch was cooler than at present. Snow and ice collected in vast amounts in the northern regions of the continent until the pressure was so great that masses pushed outward from these centers. The ice advanced chiefly southward, aided by further accumulations of snow and ice at its margin, until it reached a region where the climate was warm enough to melt the ice as rapidly as it advanced. In moving across the country from the north, the ice gathered up all sorts and sizes of materials, including clay, sand, gravel, boulders and even immense masses of rock. Some of these materials were carried hundreds of miles and rubbed against surface rocks and against each other until largely ground into powder. The great bulk of material carried, however, was derived from the old bed-rock surface and deposited perhaps within fifty miles or less of its origin. The advance of the glacier leveled off hills and ridges and filled in valleys. The melting of the ice sheet left an irregular deposit of rock material, known as glacial till, glacial drift, or boulder clay, over the surface previously covered.

There were at least four great periods during which ice sheets moved down from the north. The movements were separated by long periods during which the climate became warm and the country was again clothed with vegetation. At least one of the glaciers, known as the Illinoian, entered Jackson county and advanced somewhat farther south than Carbondale but probably did not reach over the entire southern part of the county. The exact limit of advance is impossible to determine because subsequent erosion removed the deposited drift. The deposits left by the Illinoian glacier were a heterogeneous, gravelly mass varying in thickness from a few feet on the top of old ridges to a hundred feet or more in the valleys. The region over which the glacier passed was leveled off to some extent,

but the deposits made were not thick enough to hide completely the previous topography. This action of the glacier and the resulting deposition of material explain in part the much smoother relief in the northern than in the southern part of the county.

Associated with the melting away of an ice sheet and the consequent exposure of the deposited material to weathering forces, was the accumulation of a silty, wind-blown material known as loess, on top of the glacial drift. This material was derived largely from the sediment deposited from the immense volumes of water which flowed from the melting ice sheet, this water filling the drainage channels and overflowing adjacent lowlands. Following each flood stage the water would recede and the sediment which had been deposited would dry and be picked up by the wind, blown over the upland and redeposited as a fine, silty dust. Undoubtedly some fine material was also left directly on the surface by the receding glacier and more accumulated as weathering broke down the larger drift particles. This material was also blown about by the wind when dry, and it, together with that from the lowlands, collected as a blanket covering the upland. The lack of vegetation on the land surface at this time allowed the wind to have much more force near the earth's surface than it otherwise would have had. Most of the loess deposited over Jackson county came from the Mississippi river valley, as is indicated by a thinning out of the material in all directions away from the bottom land. The thickness of the loess varies from a minimum of about four feet in the northeastern part of the county to a maximum of fifty feet or more on the bluffs along Mississippi river. Not all this loess came at the same time, however, as every glacial advance and retreat was accompanied to a greater or less extent by a loess accumulation.

Altho none of the ice sheets following the Illinoian actually touched Jackson county, they made a very important contribution to the soils of the county in that they furnished the immense volumes of water and the loess from which the soils as they exist today were developed. There were distinct periods of loess deposition over the uplands of Jackson county following the Illinoian glaciation, and it so happens that the earliest was most widespread, the second one less so, and the third confined to a relatively narrow belt near the Mississippi bluff. The oncoming of each later loess buried the earlier, so that there are at present loesses of different ages exposed at the surface in Jackson county. The age of the loess has a very significant bearing on the soils, as will be brought out later. Fig. 4 indicates the distribution of the different loesses by showing the differences in the age of soils which have developed on them.

The immense quantities of sediment brought down the major stream valleys by the waters issuing from the melting ice sheet not only served as a source of loess, but also served to dam the outlets of streams tributary to the major valleys. Blockades of this nature occurred in Big Muddy river during the time glaciers stood over central and northern Illinois, and brought into existence the glacial Lake Muddy, a large shallow lake, now extinct, extending over a large area to the north and east of Carbondale and Murphysboro. The sediment carried in by backwater from the Mississippi, that brought in from surrounding higher land by tributary streams, and that blown in as loess settled down in the lake, filling the depressions to great depths and generally leveling off the territory over which the

water stood. The presence of this glacial lake not only explains the origin of the broad, flat, poorly drained bench lands in the northeastern part of the county, but accounts for the differences in the soils of that region from those of surrounding areas.

Erosion was continually active thruout the periods of glacial drift deposition, loess accumulations, and lake filling, except when ice or water actually covered the land surface. Enough time has elapsed since the recession of the ice sheet, the close of the last loess accumulation, and the draining of Lake Muddy so that the region has been again reduced to a somewhat hilly topography. The streams have cut new valleys and are working their way back into the upland.

Soil Development

After the soil material was deposited, as described above, the soil-forming processes became active and began to change the soil material into soil. When first deposited, the soil material was rather uniform in composition; it was open, porous, high in carbonates, and amply supplied with the mineral elements of plant food. Weathering forces then began to leave their imprint, but the processes acted somewhat differently in different situations. Variations in slope, in character of original material, in vegetation, and in certain other factors, caused differences to occur in the soils as they were being formed. These differences became more and more pronounced as the weathering action continued, until finally soils with distinctly different charcteristics were evolved.

During the early stages in the life history of soils, when their distinguishing features are not clearly developed, they are said to be young. In this respect their evolution is similar to that of a living being. The soils of Jackson county are now in various stages of development. Bottom-land soils and those receiving frequent deposition, as well as those subject to rapid erosion, are very young because the material has either just recently been deposited or else recently uncovered and the weathering processes consequently have not had long to act. The upland soils in Jackson county are thus in various stages of maturity because of the different ages of the loesses from which they have been developed and also because of erosion (Fig. 4).

Three essential changes have taken place in soil development in this region, namely: (1) the solution and leaching of the more or less soluble constitutents of the soil material, including limestone particles; (2) the movement and, under conditions of poor drainage, the accumulation of very fine clay particles in the subsoil; and (3) the accumulation of more or less organic matter in the surface horizon. Solution and leaching, if sufficiently prolonged, result in impoverishment of the soil material and in the development of soil acidity. The accumulation of the clay particles under conditions of poor drainage results in the development of a slowly pervious claypan. It should be noted from the description of what takes place as soils are being developed that differences in age of material, in slope, or in vegetation would result in soils having different characteristics.

Early in the history of the weathering of the soil material, vegetation spread over the land. The simpler forms came first, followed by the higher plants as rapid chemical decomposition made an abundance of plant food available. Conditions were more favorable at first for the development of a grass vegetation;

but as streams were extended and drainage improved, forest vegetation began to encroach. The grass vegetation, with its enormous quantity of surface roots, and the high lime and moisture content of the soil material, resulted in an accumulation of organic matter and the development of a dark color in the surface soil. At this stage the soils of Jackson county were probably as productive as any now existing in central or northern Illinois. As weathering continued, however, the soil became acid and somewhat impoverished, no longer able to support a vigorous vegetative growth, and organic-matter destruction overtook accumulation, reducing the dark brown or black surface soil to gray on the nearly level areas and reddish brown on the sloping areas. The soil on areas that were later covered by timber became lighter colored in the surface than those areas which remained under grass vegetation even tho the grass vegetation lost much of its vigor of growth.

The gradual development of soil from soil material is very complex in nature, and the above described processes are only a few of the outstanding changes that take place. One of the most pronounced and universal effects of the weathering of soil material is the production of layers, or zones, in the soil, each zone having more or less definite characteristics. From a practical standpoint, these various zones can be grouped into surface, subsurface, and subsoil. The surface soil is the upper 3 to 10 inches—that part which is cultivated and in which most plant roots are found. The subsurface lies immediately below the surface, and is usually lighter in color than the surface. The subsoil begins at depths varying from 8 to 24 inches and extends down several feet. It has two divisions. The upper subsoil is the most compact and plastic layer in the soil; the lower subsoil is usually more friable than the upper and is yellowish in color. Each of these major soil layers may have two or more subzones. Differences in the arrangement, in the thickness, and in the nature of the features of the respective zones constitute the basis upon which soil types are differentiated.

THE SOIL MAP

Basis of Soil Classification

In the soil survey the "type" is the unit of classification. Each soil type has definite characteristics upon which its separation from other types is based. These characteristics are inherent in the strata, zones, or "horizons" which constitute the soil profile in all mature soils. Among them may be mentioned color, structure, texture, and chemical composition. Topography and kind and character of vegetation are easily observable features of the landscape which are very useful indicators of soil character. A knowledge of the geological origin and formation of the soil material of a region often makes possible an understanding of the soil conditions that occur.

Not infrequently, as in Jackson county, areas are encountered in which type characters are not distinctly developed or in which they show considerable variation. When these variations are considered to be sufficiently significant and the areas involved are sufficiently large, type separations are made. Because of the almost infinite variability occurring in soils, one of the exacting tasks of the soil surveyor is to determine the degree of variation allowable for any given type.

Naming of Soil Types

In previous Illinois Soil Reports, use has been made of the "descriptive" system of naming the soil types, the name itself carrying something of a description of the soil. However, with advancing knowledge of soil characteristics, and the consequent call for greater discrimination between soil types, this method of naming has become more and more unsatisfactory and impractical. It has therefore seemed best to substitute for the descriptive method the "place-name" system of nomenclature used in other states and countries.

In the "place-name" system the name of some geographical unit is arbitrarily assigned each type, this proper noun constituting the first word of the type name. Then to this word is appended one or more words descriptive of the soil texture. Members of a given soil series all bear in common the same geographic term in

FIG. 5.—STUDYING THE SOIL PROFILE

One of the very pronounced characteristics observed in most soils is that they are composed of more or less distinct layers, or strata, often spoken of in soil literature as "horizons." The vertical section of the soil showing the arrangement of these horizons from the surface down is called the "soil profile."

their names but vary in the descriptive terms according to the texture of the surface layer. This system of naming soils is simple and convenient and has that very essential merit of possibility for indefinite expansion.

To assist in designating soil types, a number is assigned to each type. These numbers are not only a convenience in referring to the respective types but they are especially useful in designating very small areas on the map.

Table 1 gives the list of the soil types as mapped in Jackson county, the area of each in square miles as well as in acres and also the percentage that each type constitutes of the total area of the county. The accompanying soil map, shown in three sections, gives the location and boundary of each soil type, and indicates the position of streams, roads, railroads, and towns.

LEGEND

5	Eroded silt loam in Ava areas
14	Ava silt loam, mature phase
214	Ava silt loam, immature phase
160	Ava silt loam. youthful phase
143	Ava sandy loam
6	Eroded fine sandy loam, in Ava areas
13	Bluford silt loam, mature phase
164	Bluford silt loam, immature phase
8	Eroded gravelly loam, in Bluford areas
85	Jacob clay loam
84	Okaw silt loam
12	Wynoose silt loam, mature phase
165	Wynoose silt loam, immature phase
108	Bonnie silt loam
75	Drury fine sandy loam
162	Gorham clay loam
161	Newart silt loam
32	De Soto fine sandy loam
3	Hoyleton silt loam
70	Beaucoup clay loam
2	Cisne silt loam
163	Fordyce silt loam
92	River sand
48	Ebbert silt loam
38	Riley sandy loam
37	Worthen fine sandy loam
31	Talbot sandy loam
9	Rough stony land
95	Sandstone outcrop
94	Limestone outcrop

CONVENTIONAL SIGNS

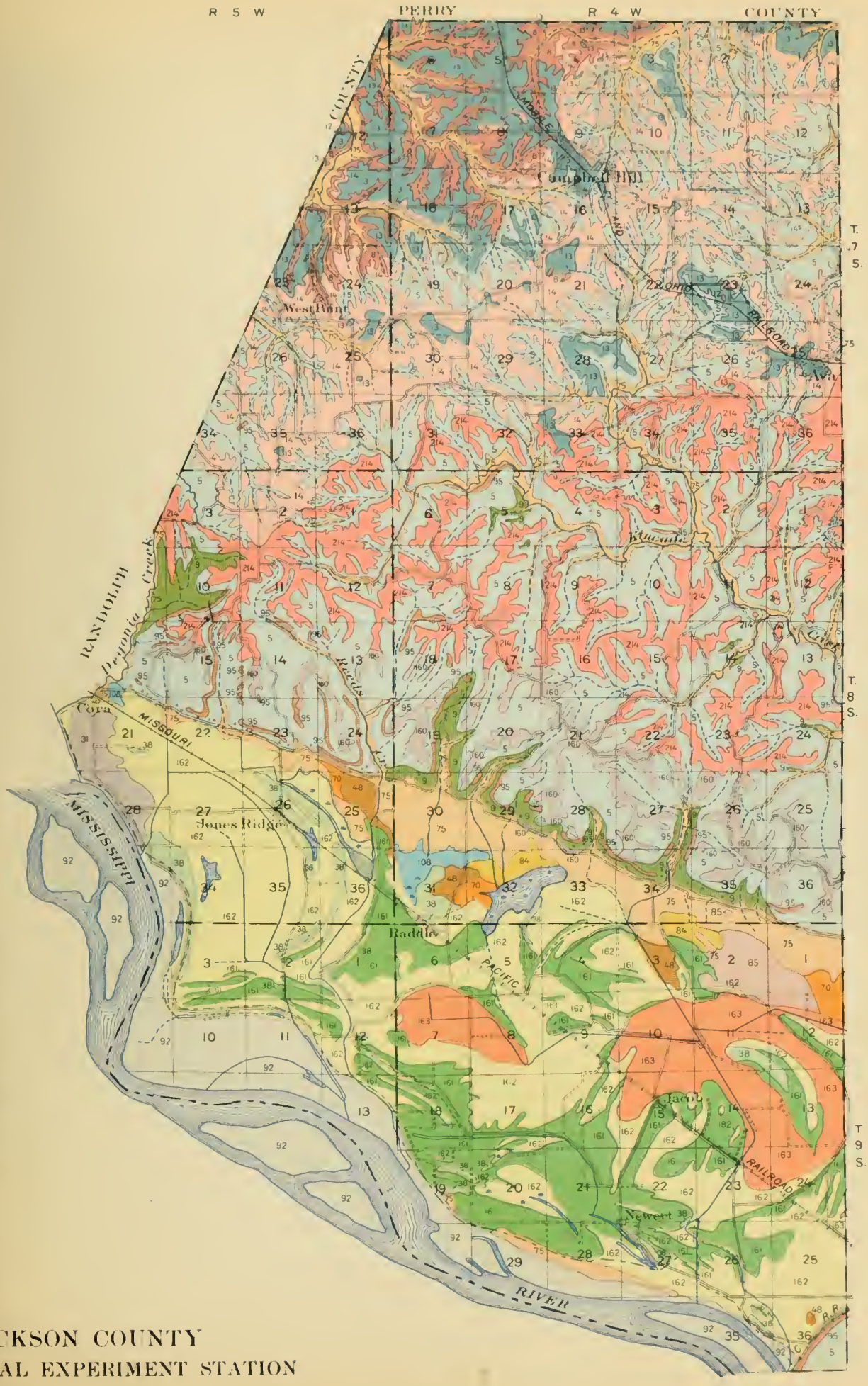
- Paved road
- Public road
- Private road (poor)
- Railroads (steam)
- Township boundary lines
- County boundary lines
- State boundary lines
- Levees
- Streams (flowing)
- Streams (intermittent)
- Lakes or ponds
- Swamps
- △ △ △ △ Small areas limestone rock outcrop
- □ □ □ □ Small areas sandstone rock outcrop
- + + + + Small areas stony loam
- O M.D Mine dump
- O B Y Brickyard
- O S.M Strip mine

Scale

0 ¼ ½ 1 2 Miles

SOIL SURVEY MAP OF

UNIVERSITY OF ILLINOIS AGRICU



OF JACKSON COUNTY
CULTURAL EXPERIMENT STATION

LITHO EASTERN OFFSET INC BALTO

TABLE 1.—SOIL TYPES OF JACKSON COUNTY, ILLINOIS

Type No.	Type name	Area in square miles	Area in acres	Percent of total area
5	Eroded silt loam in Ava areas	147.30	94 272	25.11
14	Ava silt loam, mature phase	55.56	35 558	9.51
214	Ava silt loam, immature phase	37.06	23 718	6.33
160	Ava silt loam, youthful phase	15.61	9 990	2.67
143	Ava sandy loam	3.80	2 432	.65
6	Eroded fine sandy loam in Ava areas	1.62	1 037	.27
13	Bluford silt loam, mature phase	55.04	35 226	9.42
164	Bluford silt loam, immature phase	.33	211	0+
8	Eroded gravelly loam in Bluford areas	4.77	3 053	.82
85	Jacob clay loam	20.39	13 050	3.49
84	Okaw silt loam	25.12	16 077	4.29
12	Wynoose silt loam, mature phase	22.96	14 694	3.91
165	Wynoose silt loam, immature phase	4.42	2 829	.75
108	Bonnie silt loam	44.20	28 288	7.56
75	Drury fine sandy loam	31.98	20 467	5.47
162	Gorham clay loam	25.55	16 352	4.36
161	Newart silt loam	11.48	7 347	1.96
32	De Soto fine sandy loam	8.33	5 331	1.42
3	Hoyleton silt loam	13.29	8 506	2.27
70	Beaucoup clay loam	9.62	6 157	1.64
2	Cisne silt loam	10.51	6 726	1.79
163	Fordyce silt loam	5.85	3 744	1.00
92	River sand	7.31	4 678	1.25
48	Ebbert silt loam	3.09	1 978	.53
38	Riley sandy loam	1.68	1 075	.29
37	Worthen fine sandy loam	1.61	1 030	.28
31	Talbot sandy loam	2.17	1 389	.37
9	Rough stony land	5.85	3 744	1.00
	Miscellaneous			
95	Sandstone outcrop	1.93	1 235	.33
94	Limestone outcrop	.05	32	0+
	Water	7.33	4 691	1.25
	Strip mines	.83	531	.01
	Mine dumps	.04	26	0+
	Total	586.68	375 475	100.00

DESCRIPTION OF SOIL TYPES

A brief description of the outstanding characteristics, together with some general recommendations on the use, care, and management of each soil type in Jackson county, are given in the following paragraphs. This information is further summarized in Table 2.

It is impossible to outline a complete soil-improvement and management program for a particular field or farm without knowing what soil types occur, what cropping and management practices have been followed in the past, and what type of farming is desired for the future. It is the purpose of this Report to furnish necessary information as to soil types and to bring out the main factors which should be considered in developing a soil-management program. The necessity of recognizing the type as the basis for working out such a program is illustrated by the fact that underdrainage in upland soils developed on nearly level surfaces in Jackson county is so different from that of upland soils developed on rolling slopes that the management program is entirely altered. The first consideration in the improvement of the upland soils developed on nearly level surfaces is to remove the excess surface water, while with the upland soils developed

TABLE 2.—BRIEF SUMMARY OF CHARACTERISTICS AND PROPERTIES OF JACKSON COUNTY SOILS

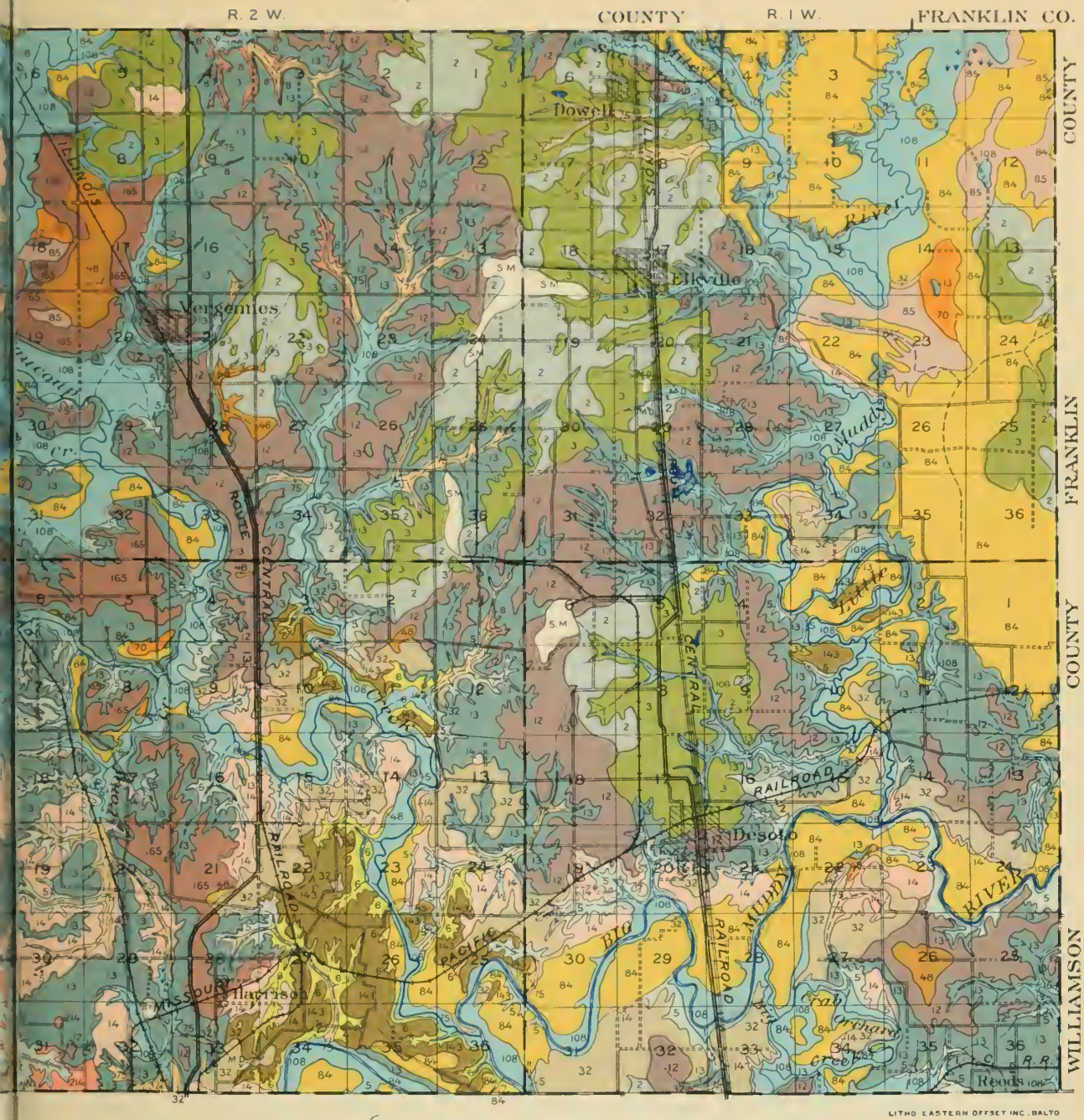
Type No.	Type name	Topography	Surface drainage	Underdrainage	Reaction	Adaptation	Potential productivity for suggested adaptation
5	Eroded silt loam in Ava areas	Rough	Good	Rapid	Neutral	Timber	Good
14	Ava silt loam, mature phase	Rolling	Good	Good	Acid	Grass, small grain, orchards, timber	Fair
214	Ava silt loam, immature phase	Rolling	Good	Good	Acid	Grass, small grain, orchards, timber	Fair
160	Ava silt loam, youthful phase	Rolling	Good	Rapid	Neutral	Grass, small grain, orchards, timber	Good
143	Ava sandy loam	Rolling	Good	Rapid	Acid	Grass, small grain, orchards, timber	Fair
6	Eroded fine sandy loam, in Ava areas	Rough	Good	Rapid	Acid	Timber	Fair
13	Bluford silt loam, mature phase	Gently rolling	Fair	Slow	Acid	General crops	Fair
164	Bluford silt loam, immature phase	Gently rolling	Fair	Fair	Acid	General crops	Fair
8	Eroded gravelly loam, in Bluford areas	Rough	Good	Rapid	Acid	Timber	Poor
85	Jacob clay loam	Nearly level	Very slow	Very slow	Acid	Timber	Fair
84	Okaw silt loam	Nearly level	Very slow	Very slow	Acid	Timber	Poor
12	Wynoose silt loam, mature phase	Nearly level	Slow	Slow	Acid	Grass crops, pasture	Poor
165	Wynoose silt loam, immature phase	Nearly level	Slow	Fair	Acid	General crops	Fair
108	Bonnie silt loam	Nearly level	Slow	Fair	Acid	Corn, grass crops, timber	Fair
75	Drury fine sandy loam	Nearly level	Good	Good	Neutral	General crops	Good
162	Gorham clay loam	Nearly level	Slow	Fair	Neutral	Corn	Fair
161	Newart silt loam	Gently rolling	Good	Fair	Neutral	General crops	Good
32	De Soto fine sandy loam	Nearly level	Slow	Fair	Acid	General crops	Poor
3	Hoyleton silt loam	Gently rolling	Fair	Slow	Acid	General crops	Fair
70	Beaucoup clay loam	Nearly level	Very slow	Slow	Acid	Timber	Fair
2	Cisne silt loam	Nearly level	Slow	Very slow	Acid	Grass crops, pasture	Poor
163	Fordyce silt loam	Nearly level	Very slow	Very slow	Neutral	Corn	Fair
92	River sand	Gently rolling	Good	Good	Neutral	Timber	Good
48	Ebbert silt loam	Nearly level	Slow	Fair	Acid	General crops	Fair
38	Riley sandy loam	Gently rolling	Rapid	Rapid	Neutral	General crops	Fair
37	Worthen fine sandy loam	Nearly level	Good	Good	Neutral	General crops	Good
31	Talbot sandy loam	Gently rolling	Rapid	Rapid	Acid	General crops	Poor
9	Rough stony land	Rough	Rapid	Rapid	.....	Timber	Poor

LEGEND

5	Eroded silt loam in Ava areas
14	Ava silt loam, mature phase
214	Ava silt loam, immature phase
160	Ava silt loam, youthful phase
143	Ava sandy loam
6	Eroded fine sandy loam, in Ava areas
13	Bluford silt loam, mature phase
164	Bluford silt loam, immature phase
8	Eroded gravelly loam, in Bluford areas
85	Jacob clay loam
84	Okaw silt loam
12	Wynoose silt loam, mature phase
165	Wynoose silt loam, immature phase
108	Bonnie silt loam
75	Drury fine sandy loam
162	Gorham clay loam
161	Newart silt loam
32	De Soto fine sandy loam
3	Hoyleton silt loam
70	Beaucoup clay loam
2	Cisne silt loam
163	Fordyce silt loam
92	River sand
48	Ebbert silt loam
38	Riley sandy loam
37	Worthen fine sandy loam
31	Talbot sandy loam
9	Rough stony land
95	Sandstone outcrop
84	Limestone outcrop

- Paved road
- Public road
- Private road (poor)
- Railroads (steam)
- Township boundary lines
- County boundary lines

NORTHEAST SHEET



LITHO EASTERN OFFSET INC., BALTO

CONVENTIONAL SIGNS

- State boundary lines
- Levees
- Streams (flowing)
- Streams (intermittent)
- Lakes or ponds
- Swamps
- Small areas limestone rock outcrop
- Small areas sandstone rock outcrop
- Small areas stony loam
- M D Mine dump
- B Y Brickyard
- S M Strip mine

Scale
0 ¼ ½ 1 2 Miles

SURVEY MAP OF JACKSON COUNTY
OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

on rolling slopes the main problem is to retard the rate of surface run-off and thus reduce erosion.

In connection with suggestions for the management of the various soil types of Jackson county, frequent reference is made to:

Circular 290, "Saving Soil by the Use of Mangum Terraces"
Circular 346, "Test Your Soil for Acidity"
Bulletin 337, "A Field Test for Available Phosphorus in Soils"

These publications, as well as any others mentioned, may be obtained free of charge on request to the Agricultural Experiment Station, University of Illinois, Urbana.

Eroded silt loam in Ava areas (5)

Eroded silt loam in Ava areas occupies about 147 square miles in Jackson county, or about one-fourth of the total county area. It occurs on the very rolling and steep slopes which have been produced largely by erosion. It has been mapped most extensively along the Mississippi river bluff and in the southern part of the county but is found scattered over the upland thruout the county with the exception of the northeastern corner. This type is derived from the wind-blown material, called loess, and is subject to severe erosion.

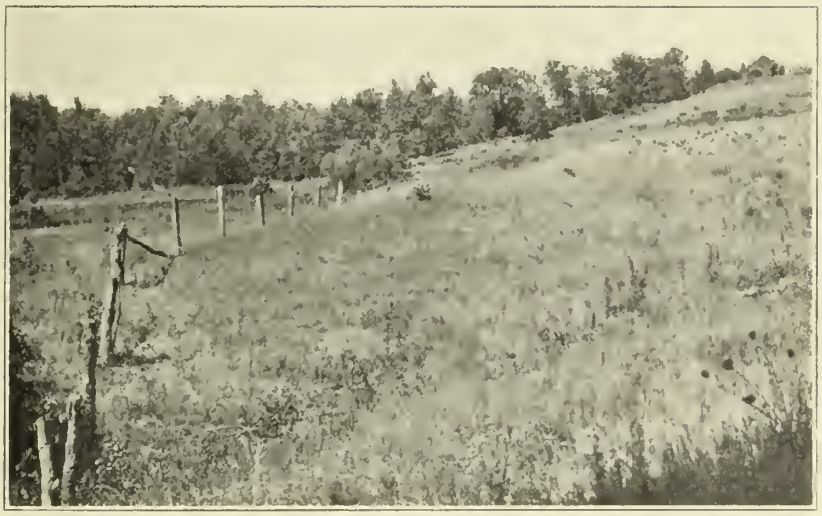


Fig. 6.—A Hillside Spoiled by Erosion Resulting From Cultivation

Much of the sloping land which has been put under cultivation has been badly damaged by erosion. Such land might better be reforested.

Eroded silt loam in Ava areas has little or no soil development because the surface is removed as fast as or faster than the soil forms. The material varies in texture from a coarse silt to a fine sandy loam, and is yellow or reddish yellow in color. Near the Mississippi bluff erosion has exposed calcareous loess in many places, but thruout the rest of the county the material is slightly to strongly acid in reaction.

Use and Management Suggestions.—Eroded silt loam cannot be cultivated successfully over a period of years because of the rapid removal of surface material by erosion. Most of the areas of this type which have been cleared of

timber are now abandoned for cultivation and are returning to their original forest state. The less steep slopes along the Mississippi bluff, where the material is not acid and is high in available plant nutrients, can be used for pasture. Alfalfa can be successfully grown if given very careful attention. Before seeding alfalfa the soil should be tested for its need for limestone, as explained in Circular 346 of this Station, "Test Your Soil for Acidity." If the land is sour, alfalfa will not grow unless limestone is added. Any attempt to crop this land should include provision for a vegetative cover on the surface at all times.

FIG. 7.—ALFALFA ON AVA SILT LOAM

Under proper soil management much of the rolling land produces good crops of alfalfa. In addition to its high feeding value alfalfa affords good protection from the destructive effect of erosion.

A number of peach and apple orchards have been set out on areas of this type in the southern part of the county, but owing to the steepness of the slopes and to rapid erosion only a few have been successful. Where the slope is greater than 18 to 20 percent, the added cost of cultivation, spraying, and harvesting, together with the difficulty of supplying the elements of plant food, have increased the cost of production beyond the margin of profit. Terraces must be constructed on this land before the orchard is planted if erosion is to be controlled, and on slopes greater than 20 percent even terraces are ineffective. Circular 290 of this Station, "Saving Soil by the Use of Mangum Terraces," gives information on the details of constructing terraces.

Probably the most profitable use of this soil type is in the growing of forest trees. The soil will grow marketable timber satisfactorily and profitably if fires are controlled and no attempt is made to pasture the land. Information about reforestation may be obtained from the Agricultural Experiment Station. Areas of this type now in timber should remain in timber and most of the cleared areas should be replanted with trees.

Ava silt loam, mature phase (14)

Ava silt loam, mature phase, occurs on the rolling upland, chiefly in the northwestern and southeastern parts of the mature soil region of the county (Fig. 4). It occupies about 55 square miles, or nearly 10 percent of the total area of the county. This soil is characterized by an open, reddish yellow subsoil. It has

excellent surface drainage and good underdrainage but is subject to severe erosion when cultivated. It was originally covered with forest vegetation, most of which has been cleared off for farming.

The surface soil is a friable, brownish yellow silt loam varying from 4 to 7 inches in thickness. The subsurface is also friable and yellow. The subsoil begins at 8 to 13 inches below the surface. Its upper part is a reddish yellow, slightly compact, nonplastic silty clay loam which falls into large granules if broken apart. The lower subsoil beginning at 22 to 28 inches is more compact than the upper and the particles have a thin gray coating.

Use and Management Suggestions.—The first provision to be made in the management of this soil, when it is used for farming, is to protect it from erosion. Terraces can be built, as suggested in Circular 290, to check the run-off. Vegetation should be kept on the surface as much as possible in order to help provide this protection. Turning under animal manures and green manuring crops will lessen the harmful effect of erosion.

Some areas of this soil occur as very irregularly shaped, elongated islands within large areas of Eroded silt loam, thus complicating the cultivating and harvesting of crops. These areas might well be included in the general reforestation program suggested for Eroded silt loam.

This soil is medium to strongly acid both in the surface and subsoil. If red clover or sweet clover is to be grown, each field should be tested for acidity, as explained in Circular 346, and limestone applied as the test indicates. These legumes, especially sweet clover, are good green manuring crops to use in building up the producing capacity of this soil. The addition of a phosphate fertilizer will probably give a good return, particularly if legumes are grown. It would be advisable, however, to test for available phosphate, as explained in Bulletin 337 of this Station, "A Field Test for Available Phosphorus in Soils," before applying this material. Alfalfa will do well on this soil following liming and phosphating, but dry summers are likely to cut the yields somewhat.

Winter grains and grass crops should predominate in the crop rotation on this soil. Corn will yield profitably, except in dry summers, but corn should not be grown more than once in four years. This soil is well adapted to vegetable, small fruit, and orchard crops because it dries out early in spring and has good air drainage.

Ava silt loam, immature phase (214)

Ava silt loam, immature phase, occurs on the rolling, well-drained upland in the immature soil region of the county (Fig. 4). It differs from Ava silt loam, mature phase, chiefly in having a thicker surface soil and a more open subsoil, and in being less acid and more productive. These differences are thought to be due to the thicker loess deposit from which it is derived and to the larger amount of younger loess in the upper part of the profile. This type occupies about 37 square miles, or about 6 percent of the total area of the county. A larger portion of it is covered by standing timber than is Ava silt loam, mature phase.

The surface soil is a very friable, brownish yellow, coarse silt loam varying from 5 to 9 inches in thickness. The subsurface is friable and reddish yellow. The subsoil begins at a depth of 10 to 15 inches and is a reddish yellow, slightly com-

pacted, nonplastic silty clay loam; below 24 to 26 inches it becomes very friable except in the transition area between the mature and the immature soil regions. The thinning of the younger loess in areas away from the bluff brings the compact zone developed in the older loess nearer the surface, where it forms the lower subsoil in the soils of this region.

Use and Management Suggestions.—In general the same management and use as suggested for Ava silt loam, mature phase, apply to this immature phase. The water-absorbing power of this soil is higher than that of the mature phase of the type, probably in part because of its higher organic-matter content. However, the average slope on which it lies is steeper, and erosion is therefore equally as destructive. The most serious problem in the use of this land for general farming is erosion. This should be recognized and every effort made to decrease it; otherwise rapid soil destruction is inevitable.

The acidity of this soil varies from slight to medium. In favorable years it will grow red clover without the application of limestone, but as previously noted, favorable climate occurs so seldom that to be safe limestone should be added in amounts indicated by the test. The content of available phosphorus is generally higher than in the mature phase of the type, but the fact that soils similar to this type have not been found to respond to phosphate applications indicates that phosphate should be applied only on a trial basis at first. Testing for available phosphorus present, as suggested in Bulletin 337, will serve as a guide in laying out trial plots. The application of sufficient limestone to grow sweet clover or alfalfa, the use of all the manure available, and the careful conservation and turning down of crop residues will result in satisfactory yields.

Many areas of this soil occur as very irregularly shaped, elongated islands within large areas of Eroded silt loam, thus complicating the cultivating and harvesting of the crop. These areas might well be included in the general reforestation program suggested for Eroded silt loam.

Ava silt loam, youthful phase (160)

Ava silt loam, youthful phase, occurs on the narrow remnants of the upland near the Mississippi river bluff in the youthful soil region of the county (Fig. 4). It has been developed from the most recent wind-blown accumulation which lies on top of the same material from which the immature soils are derived. Nearly half the total area of this type has been left in timber. Most of the cleared area lies to the southwest of Murphysboro. This type occupies about 15 square miles, or nearly 3 percent of the total area of the county.

The surface soil is a loose, mellow, yellowish brown, very coarse silt loam varying from 6 to 18 inches in thickness. The soil is thickest near the bluff and becomes thinner away from the bluff. The regularity of this thinning has been interfered with locally by erosion. Because of its youth this soil shows no profile development below the surface horizon, which rests upon the surface soil of Ava silt loam, immature phase. The surface layer of the older, buried soil is difficult to distinguish from the surface horizon of the younger phase, tho the older soil is slightly lighter in color and is not so coarse in texture.

Use and Management Suggestions.—By far the most important principle in the management of Ava silt loam, youthful phase, is protection from erosion.

This type occurs on narrow divides which form the tops of steep slopes giving the run-off excellent opportunity to wash material down the slope. Terraces can be built, as suggested in Circular 290, to check the run-off, and vegetation should be kept on the surface as much as possible to help provide this protection.

The soil of this type is nearly neutral in reaction and will grow red clover, sweet clover, and alfalfa without lime, altho if the land has been cultivated very many years a light lime application will increase the growth of sweet clover and alfalfa. Because the content of available phosphorus in the virgin soil is high, the probabilities are that a phosphate application would not be profitable unless the land has been long cropped without the growing and turning under of legumes. In any event, trial applications should be made before a general phosphating program is decided upon. Testing for available phosphorus in the soil, as explained in Bulletin 337, will supplement trial applications in many cases. Regular additions of manure, either animal manure or green manuring crops, as a means of increasing and maintaining the organic-matter content, keeps this soil in condition to raise good crops for a long time to come. The area of this type to the southwest of Murphysboro has proved very desirable for orcharding.

As in the case of certain other types described, many areas of this type occur as very irregularly shaped, elongated islands within large areas of Eroded silt loam, thus complicating the cultivating and harvesting of the crop. It is recommended that these areas be included in the general reforestation program suggested for Eroded silt loam.

Ava sandy loam (143)

Ava sandy loam occupies about 4 square miles, somewhat less than 1 percent of the total area of the county. It occurs on the undulating to rolling upland near Big Muddy river in the vicinity of Murphysboro. This soil was originally covered with timber but practically all of it has been cleared for cultivation. It is characterized by an open, well-drained subsoil, and is subject to surface erosion.

The surface soil is a loose, light brownish yellow sandy loam varying from 3 to 6 inches in thickness. The subsurface is a reddish yellow fine sandy loam. The subsoil, beginning at 14 to 17 inches, is a slightly compacted, reddish yellow loam. There is enough clay in this layer to bind the coarser soil particles together and cause moisture to be retained. The lower subsoil below 32 to 34 inches is a loose, reddish yellow fine sandy loam. The soil particles in the subsoil are lightly coated with gray.

Use and Management Suggestions.—The recommendations suggested for the use and management of Ava silt loam, mature phase, apply to this sandy type also, altho the sandy type occurs on smoother topography and therefore is not subject to such severe erosion as is the mature phase. However, provision must be made to protect the soil from erosion if it is to be cultivated frequently. This soil is lower in organic-matter and nitrogen content than its silt loam correlative described, and frequent additions of animal manure or green manuring crops should be plowed under to increase the supply. The soil is slightly to medium acid in reaction and is low in available phosphorus. It should be tested, as explained in Circular 346 and Bulletin 337, for its need for limestone and phosphorus if sweet clover or alfalfa is to be seeded.

Eroded fine sandy loam in Ava areas (6)

Eroded fine sandy loam in Ava areas occupies less than 2 square miles and occurs in the gullies that have been established in areas of Ava sandy loam. It shows little soil development, the material being a loose, grayish yellow, fine sandy loam. It occupies steep slopes on which erosion is active. It should not be cultivated but should be devoted to permanent pasture or reforested. The reader is referred to the suggestions given for the use and management of Eroded Silt Loam, pages 15-16, for further recommendations for this soil.

Bluford silt loam, mature phase (13)

Bluford silt loam, mature phase, occurs on the intermediate sloping upland that is now, or was formerly, covered with timber. It occupies about 55 square miles in the mature soil region of the county. The soil has been developed from a thin blanket of the second loess which was deposited over the top of a soil developed from an older loess. The compact subsoil developed by the older loess strongly influences the character of this soil.

This type has fairly good surface drainage but underdrainage is relatively poor. Sheet erosion is harmful on the more rolling slopes.

The surface soil is a brownish yellow-gray silt loam 5 to 7 inches thick. The subsurface is grayish yellow in the upper part and gray in the lower. The subsoil begins at 14 to 17 inches and is a grayish yellow, medium-compact and plastic clay loam. The lower subsoil below 20 to 24 inches is much more compact than the upper. This lower subsoil is the compact layer of the old soil developed on the first loess. At 40 to 44 inches below the present surface the material becomes more friable.

Use and Management Suggestions.—An efficient management program for Bluford silt loam, mature phase, must take into consideration the following factors: improvement of drainage, checking of sheet erosion, correction of acidity by liming, and application of fertilizers. Altho this soil has fairly good surface drainage, the compact subsoil retards underdrainage to the extent that provision must be made to remove the surface water quickly if the soil is to be ready for cultivation in the early spring. This can be done by means of shallow surface ditches placed 3 or 4 rods apart. These ditches should be properly constructed and continually watched so that gullies will not develop. Tile placed 3 to 4 rods apart, and 24 to 30 inches deep, will also provide drainage but such an installation is too expensive to be practicable in most cases.

Sheet erosion on this type occurs chiefly in winter, when rain falls on a thawed surface while the lower part of the soil remains frozen, giving no opportunity for the water to soak in. Continual heavy rains in late fall and spring also result in sheet washing. Increasing the organic-matter content of the soil and keeping vegetation on the surface during these periods are the best practices to follow in order to protect the land against sheet erosion.

This soil is strongly acid both in the surface and subsoil. If legumes are to be grown, each field should be tested in detail for its lime requirement, as explained in Circular 346, and then lime should be applied as the test indicates. The regular growing and turning under of sweet clover as a green manuring crop will increase

the organic-matter content of the soil and provide an adequate supply of nitrogen for the grain crops. Experiments conducted by the Experiment Station on soil of similar character indicate that these practices, together with the addition of animal manure equal to the weight of the crops removed, should under a proper crop rotation produce an average yield of 38 to 45 bushels of corn, 28 to 35 bushels of oats, and 18 to 22 bushels of wheat an acre a year.

FIG. 8.—A FIELD ABANDONED BECAUSE OF SHEET WASHING

This is typical of many abandoned fields located on similar soils in Jackson county. Under proper soil management much of this land could well be used for pasture, orchards, or timber.

These same soil experiment fields indicate further that an average increase of 2 to 4 bushels in the corn, oats, and wheat crops can be expected upon the application of phosphorus and potassium to the soils of this type after they have been properly drained and limed and have had the organic-matter content built up. The increase in grain yields resulting from the application of these two plant-food elements on the experimental plots has not been sufficient to pay the cost of the fertilizers in the amounts in which they were added. In recent years, however, the potassium application added to the phosphated plot has given profitable returns for corn on the Enfield field, indicating that when a field has been built up by a lime-legume program it may give profitable increases for potassium in addition to phosphorus after a period of years has elapsed. For a more complete discussion of this subject, see Bulletin 362, "Response of Illinois Soils to Systems of Soil Treatment," page 500. Whether these same increases could be obtained by the application of smaller quantities of phosphorus and potassium than were used in these experiments cannot be definitely stated. It is suggested that those interested in increasing yields beyond the average figures cited above give these fertilizers a limited trial before using them extensively.

Bluford silt loam, immature phase (164)

Only two areas of Bluford silt loam, immature phase, were mapped in Jackson county. They occur in Sections 8 and 9, Township 8 south, Range 3 west, (Levan

township) and occupy only 211 acres. This type differs from Bluford silt loam, mature phase, in having a thicker, darker colored surface soil, a less compact and plastic upper subsoil, and a much more friable lower subsoil. It is naturally better drained, is less acid, and is more productive than the mature phase.

The use and management suggestions given for Bluford silt loam, mature phase, apply to this type, but the average yields should be higher and the response to soil treatment greater than on the mature phase.

Eroded gravelly loam, in Bluford areas (8)

Eroded gravelly loam in Bluford areas occupies nearly 5 square miles, or a little less than 1 percent of the total area of the county. It occurs on the short, steep slopes in the mature soil regions (Fig. 4). All the wind-blown silt that originally covered the areas of this type has been eroded away and the weathered, sandy, gravelly glacial drift forms the soil material. Eroded gravelly loam shows no soil development because erosion removes the material faster than a soil forms.

Use and Management Suggestions.—Because of erosion this type cannot be successfully cultivated. Neither does it make good pasture land, not only because it erodes but also because the soil is so poor that grass will not make a good growth. Most of this type occurs as small isolated areas that can best be utilized as permanent woodlots. Information about the planting and care of a woodlot and the harvesting of its growth can be obtained by writing the Illinois Agricultural Experiment Station.

Jacob clay loam (85)

Jacob clay loam is a bottom-land soil occurring principally along Big Muddy river in the Mississippi bottom. It occupies about 20 square miles, or 3.5 percent of the total area of the county. This soil was formed from sediment deposited from the waters of Big Muddy river. It is subject to frequent overflow and a considerable area is in a semi-swampy condition. It lies on very nearly level topography not much above the level of the stream channel.

The soil shows little development, owing to frequent deposition of material on the surface. The surface soil is a heavy, tough, gray clay loam varying from 3 to 9 inches in thickness. In a few places an inch or two of silt has been deposited over the clay. Below the surface soil the material is lighter in color but maintains a heavy plastic nature to a great depth.

Use and Management Suggestions.—Most of the attempts made to cultivate Jacob clay loam have failed. In years when the spring is dry and the rainfall is well distributed during summer, fair crops of corn can be raised, but these conditions do not occur on the average oftener than once in ten years. Because of insufficient slope and the extreme heaviness of the soil, neither open ditches nor tile will adequately drain the land.

A very large part of this type has been abandoned for cultivation and is being allowed to return to its original timbered state. No doubt the most profitable use of this land is for the growing of timber. It will probably grow marketable trees at a profit if fires are controlled and no attempt is made to pasture the land. Information about the growing of timber on this land can be obtained from the Agricultural Experiment Station.

Okaw silt loam (84)

Okaw silt loam is a bottom-land soil occurring along Little Muddy and Big Muddy rivers and in the Mississippi bottom. It is subject to overflow, some portions more frequently than others, according to the level on which it occurs. The type occupies nearly 23 square miles, somewhat more than 4 percent of the total area of the county. The soil was formed by the deposition of a silty layer over a heavy clay. It is closely related to the Jacob clay loam.

The surface soil is a pale yellowish gray silt loam 3 to 4 inches thick. The subsurface is an ashy gray silt loam varying from 5 to 12 inches in thickness. The subsoil is a heavy, plastic, pale yellowish gray clay 15 to 20 feet or more thick.

Use and Management Suggestions.—Crop failures on Okaw silt loam have been about as frequent as those on Jacob clay loam. Its agricultural value for grain cropping is low, and because of the impossibility of securing adequate drainage by any known practical means it is inadvisable to attempt to crop it. This type should be kept in timber, or if it has been cleared it should be replanted and allowed to remain permanently in forest.

Wynoose silt loam, mature phase (12)

Wynoose silt loam, mature phase, occurs on the nearly level-lying, poorly drained upland in the northeastern part of Jackson county. It occupies about 23 square miles, or nearly 4 percent of the total area of the county. It has been developed from a thin blanket of the second loess deposited over the top of the soil developed from the older loess. The compact subsoil developed on the older loess and the nearly level-lying topography created a poor drainage situation which strongly influenced the character of this soil. Both the surface drainage and the underdrainage of this type are poor. The type was formerly covered with timber, chiefly oak and hickory, but most of it has been cleared for cultivation.

The surface soil is a friable, brownish yellow-gray silt loam varying from 4 to 7 inches in thickness. Hard, black, rounded pellets occur in the upper portion of the soil. The subsurface is a pale yellowish gray; in the lower part it is light gray and ashy. The subsoil begins at 18 to 22 inches and is a pale yellowish gray clay, very compact and plastic. Below 42 to 45 inches the subsoil is less compact and more yellowish.

Use and Management Suggestions.—The productivity of this soil when untreated is so low as to make it unprofitable for grain crops. The untreated plots at Raleigh and Sparta experiment fields, which are located on soil similar to this type, have averaged only about 5 bushels of wheat, 10 bushels of oats, and less than 20 bushels of corn an acre a year. The principal handicap in crop production is poor drainage. The lack of sufficient slope to carry away surface water and the impossibility of securing drainage thru the clay-pan subsoil make the drainage problem difficult. The fact that most of the areas of this type in Jackson county are within a short distance of an established drainage channel makes it possible to construct surface ditches that will carry away most of the surface water. The main ditches should be at least 3 feet deep and graded so that water will not stand in them. Lateral ditches should then be extended out into each field not more than 3 rods apart. All attempts to tile this land have been unsuccessful because

of the slowly pervious subsoil. Not only does the subsoil impede the movement of moisture downward, but it also restricts the penetration of roots and causes shallow rooting.

Wynoose silt loam is low in organic matter and nitrogen and is strongly acid. After drainage has been properly established (and unless it can be, probably all efforts to increase crop yields will be unsuccessful), each field should be tested for its lime requirement, as explained in Circular 346. The experiment fields located on this soil type have proved lime to be the basic treatment for soil im-

FIG. 9.—CORN ON THE RALEIGH FIELD WITH AND WITHOUT SOIL TREATMENT

At the right no treatment has been applied; at the left, manure, limestone, and phosphate have been applied. The major effect has been produced by the limestone and manure. The Raleigh experiment field is located on a soil type similar to Wynoose silt loam, mature phase.

provement. Satisfying the lime requirement will make it possible to grow and turn under sweet clover, and thus increase the organic-matter and nitrogen content. Manure applied in an amount equal to the weight of the crops removed, in addition to the lime-legume program, has increased the yields on the above-mentioned experiment fields to an average of about 18 bushels of wheat, 23 bushels of oats, and 38 bushels of corn an acre a year.

The use of mineral fertilizers, such as phosphorus and potassium, in addition to manure and lime, has given some increase in yield, but the increase has not paid the cost of the fertilizers. Those desiring to use mineral fertilizers on this soil should first try them on a limited area before using them extensively.

In the absence of soil treatment, the growing of redtop for seed has proved the most profitable way to utilize this land in recent years. Corn is an uncertain crop on the untreated land. Because of poor drainage alfalfa usually fails even after

the lime requirement has been satisfied. What is the best use for this soil is a difficult question which cannot be answered with certainty at the present time. These are reasons for thinking that the best use of the land may be as pasture.

Wynoose silt loam, immature phase (165)

Most of Wynoose silt loam, immature phase, occurs as bench land along Beaucoup creek. One small area of about 50 acres occurs in Section 9 of Levan township. This type occupies about 4 square miles, or less than 1 percent of the total area of the county. The development of this soil on the bench land along Beaucoup creek was strongly influenced by the waters of the glacial Lake Muddy. In all probability the water did not withdraw from the area now occupied by this type until some time after it had left the surrounding areas.

This type differs from Wynoose silt loam, mature phase, in having a thicker, darker colored surface soil, a much deeper subsurface layer, and a less compact subsoil. Proper drainage is just about as difficult to obtain for it as for the mature phase of the type because it is somewhat more nearly level-lying. This soil is less acid, however, and naturally more productive. The suggestions for the use and management of Wynoose silt loam, mature phase, apply to this type also, with the exception that the average yields of grain crops can be expected to be higher and the response to soil treatment somewhat greater.

Bonnie silt loam (108)

Bonnie silt loam occurs as bottom land along the larger creeks and Big Muddy river. It occupies about 44 square miles, or nearly 8 percent of the total county area. The material which forms this soil is largely silt brought down from upstream and surrounding uplands. The bottom lands are nearly level, poorly drained, and often swampy. This soil has but little horizon development because it is subject to frequent overflow and is continually receiving new deposits.

The surface soil is a friable, yellowish gray silt loam, varying from 6 to 12 inches in thickness. Below the surface the material is lighter in color and oftentimes more sandy in texture, particularly along Cedar creek. No subsoil proper has developed.

Use and Management Suggestions.—Frequent overflows limit the use of this type to summer crops and pasture. This soil is naturally poorly drained but it can be artificially drained by ditching if care is observed to obtain proper fall. A large part of the area of this type has not been cleared and, because of poor drainage and frequent inundations due to stream overflow, might properly remain in timber. If overflow is not too frequent, and drainage can be well established so that cropping is justified, lime should be applied as explained in Circular 346. Following the application of lime, sweet clover or some other legume can be grown and plowed under to increase the organic-matter content. A trial of some of the readily available mineral fertilizers, either separately or as a commercial mixture applied to corn at planting time, might be made on this type.

Corn is the principal crop grown on this land because it dries early enough in summer so that the crop can be planted and it seldom overflows until after the corn can be harvested in the fall. Soybeans might also be grown. Most of the land is not cropped, however, but is either used as pasture or allowed to remain idle.

Drury fine sandy loam (75)

Drury fine sandy loam occurs in the small, narrow bottom lands thruout the county and at the base of the bluff in the Mississippi bottom. It occupies about 32 square miles, or 5½ percent of the total county area. This soil is subject to frequent overflow following heavy rains, but the water drains away quickly. The material from which it is derived is recent sediment washed in from surrounding uplands. It consists, for the most part, of a brownish yellow to yellowish gray, fine sandy loam varying from 12 to 60 or more inches in thickness. In the small stream bottoms in the northern and eastern parts of the county the fine sandy loam is mixed with coarser sand and some gravel, and a few rocks and boulders which have fallen down from adjacent cliffs are sometimes found.

Use and Management Suggestions.—Altho this type is naturally productive its use is limited, because of frequent floodings, to short-season crops such as corn and soybeans. A few areas of this type along the Mississippi bluff are sufficiently protected from overflow so that winter wheat and alfalfa can be successfully grown. The frequent overflows are in some ways beneficial because they deposit sediment, thus continually renewing the soil material. It is for this reason that no soil treatment is suggested. Because of frequent flooding and inaccessibility, most of the small bottoms are not cultivated but are used for pasture or else remain in timber.

Gorham clay loam (162)

Gorham clay loam occurs in the Mississippi bottom, and altho it is protected by levee from river overflow it is frequently inundated by rain water and water from bluff streams. It occupies nearly 26 square miles. The material from which it was formed was deposited as sediment from back water.

The surface soil is a brownish drab, plastic clay loam varying from 6 to 9 inches in thickness. The subsurface is more plastic and lighter in color than the surface. The subsoil is a slightly compact and plastic grayish drab clay. Below 26 to 30 inches the color is light gray. At 40 to 44 inches the clay material changes to a sandy loam.

Use and Management Suggestions.—Gorham clay loam is wet during rainy seasons and always difficult to cultivate. During some years it remains too wet to permit a seed bed to be prepared for corn. Winter wheat yields high in favorable seasons. The lack of a proper outlet makes draining difficult, but where an outlet can be obtained surface ditches will aid in drying the soil earlier in the spring. The soil reaction is near neutral, but if sweet clover is to be seeded the land should be tested for its lime requirement, as suggested in Circular 346, and lime added if the test so indicates. Sweet clover and other green manuring crops, as well as all crop residues, should be plowed under frequently in order to increase the organic-matter content and thus make the soil easier to cultivate. This soil is not desirable for general farming purposes because of the overflow hazard, poor drainage, and the heavy nature of the soil.

Newart silt loam (161)

Newart silt loam occurs in the Mississippi bottom on low undulating ridges. It overflows only during high flood periods, and the flood water soon drains away.

It occupies about 11 square miles, or nearly 2 percent of the total area of the county. The material from which it was formed was deposited from moving flood water on top of sand which had been previously deposited by the Mississippi river.

The surface soil is a friable, grayish drab silt loam 6 to 8 inches thick. The subsurface is a brownish drab, slightly plastic, silty clay loam. The subsurface rests upon a sandy loam which is yellow and open but contains enough fine material to retain moisture satisfactorily. The sandy loam occurs at 15 to 26 inches below the surface, being shallower on the tops of the low ridges and deeper between the ridges.

Use and Management Suggestions.—This type is one of the most desirable soils for general farming purposes in Jackson county. It is easily cultivated, naturally well drained, and contains an abundance of plant-food elements. It is near neutral in reaction, and will grow sweet clover and alfalfa without the application of lime. Care should be observed to see that the organic-matter and nitrogen content are maintained by the regular plowing under of crop residues, green-manuring crops, and animal manure. This soil should produce good grain crops, except in years of very high water, without any treatment other than that suggested.

DeSoto fine sandy loam (32)

DeSoto fine sandy loam occurs along Big Muddy river in the vicinity of and to the northeast of Murphysboro. It occupies about 8 square miles, or somewhat less than 1.5 percent of the total county area. It is found on nearly level topography and so has poor surface drainage. The underdrainage is poor to fair, better than Wynoose silt loam, but not so good as Ava silt loam. The material from which this soil developed was deposited in part by wind and in part by water. Probably most of the sand was deposited in glacial Lake Muddy, and after the draining of the lake was re-sorted by the wind.

This soil resembles Wynoose silt loam, immature phase, but differs from it chiefly in having a sandy texture and a more open, yellowish subsoil. The surface soil is a friable, dark yellowish gray, fine sandy loam about 6 inches thick. It is loose and open when dry. The subsurface is a light yellowish gray fine sandy loam, the lower part of which is of an ashy nature. The subsoil begins at 19 to 21 inches and is a pale yellowish gray clay loam, medium-compact and plastic. Below 32 to 36 inches the subsoil color changes to a brighter yellow and the material is friable.

Use and Management Suggestions.—DeSoto fine sandy loam is not naturally very productive but it can be built up by proper treatment to produce fair crops. Drainage should be provided first, either by open surface ditching or by tiling as suggested for Wynoose silt loam. This type is medium-acid and should be tested for its lime requirement, as suggested in Circular 346, before limestone is applied. Following liming, sweet clover should be grown and turned under to increase the organic-matter content. This treatment plus the regular addition of animal manure will probably put the soil in condition to produce satisfactory yields of grain. Further treatment should be on a trial basis, for no records are available as to responses for phosphate and potassium applications on this soil. These ferti-

lizing materials will probably give some increase in yields, but whether the increases will justify the cost must be determined upon trial. Testing for available phosphorus, as explained in Bulletin 337, may indicate the nature of the trials to be made.

Hoyleton silt loam (3)

Hoyleton silt loam occurs in the northeastern part of the county on undulating land that has never had a heavy timber growth. It occupies about 13 square miles, or slightly more than 2 percent of the total area of the county. The material from which this soil was developed was deposited as loess during and after the time glacial Lake Muddy covered that portion of the county. This soil has fair surface drainage but poor underdrainage.

The surface soil is a friable, brownish gray silt loam 6 to 7 inches thick. The upper subsurface is yellowish gray and the lower ashy gray with orange mottlings. The subsoil begins at a depth of 15 to 18 inches and is an orange-mottled, pale yellowish gray, compact and plastic clay. Below 33 to 35 inches the subsoil becomes more friable and yellowish in color.

Use and Management Suggestions.—The productivity of the untreated soil of this type is about the same as that of the soil occurring on nearly level-lying topography in this region, but because it is developed on slight slopes there is a possibility of treating it so that it will produce reasonably satisfactory yields. Drainage can be provided by shallow surface ditches placed 3 to 4 rods apart. Tile will not draw because of the almost impervious subsoil.

When drainage has been provided, each field should be tested for its lime requirement, as suggested in Circular 346, and lime applied as the test indicates. Sweet clover grown and turned under, plus regular additions of animal manure, should build up the land so that an average of 15 bushels of wheat, 25 bushels of oats, and 45 bushels of corn an acre a year can be expected, according to tests on the Ewing field, a part of which is located on this soil type. These same plots at Ewing indicate further that the addition of phosphorus and potassium together will increase the above yields and return a small profit on the investment. Phosphorus alone, in addition to limestone and legumes, has not been profitable. It is suggested that neither phosphate nor potash be applied until the lime-legume program has been going for some time.

Beaucoup clay loam (70)

Beaucoup clay loam is a bottom-land soil occurring principally in the Mississippi bottom in association with Jacob clay loam. It was formed from sediment deposited from standing water, and the type has remained poorly drained and swampy. It occupies about 10 square miles, or somewhat less than 2 percent of the total area of the county.

The surface soil is a sticky, tough, drab clay loam 4 to 8 inches thick. There is no true subsurface and subsoil development, the color of the material beneath the surface gradually becoming grayish drab, and below 18 to 25 inches, gray. The tough, plastic nature of the material continues to depths of several feet.

Use and Management Suggestions.—Except for its darker color and higher organic-matter content, which makes it somewhat easier to cultivate, Beaucoup

clay loam is similar to Jacob clay loam, and the reader is referred to the recommendations suggested for the use of that type (page 22) as a guide to this one.

Cisne silt loam (2)

Cisne silt loam occurs in the northeastern part of the county on nearly levellying, very poorly drained land. It occupies 10½ square miles, or nearly 2 percent of the total county area. The material from which this soil was developed was deposited as loess during and after the time glacial Lake Muddy existed. This soil is cold and wet in spring and drouthy in summer. It is characterized by an almost impervious subsoil.

The surface soil is 5 to 7 inches thick and is a friable, light brownish gray silt loam. The upper part of the subsurface is light gray and the lower part ashy. Numerous small, hard, rounded, black pellets occur in the surface and subsurface. The subsoil begins at 19 to 22 inches and is a pale yellowish gray, very compact and plastic clay. Below 40 to 42 inches the subsoil is less compact and plastic and more yellowish.

Slick spots, commonly known as scalds or alkali spots, occur on this type. These spots can be recognized by their lighter colored surface soil, the pale yellowish or greenish gray color of their subsoil, and the stunted vegetative growth on them. The formation of these spots is due to interruption of the leaching of the basic material from the surface loess deposit and its accumulation in the subsoil. This interruption of leaching was caused by the presence of a slowly pervious layer below. The accumulation of bases in the subsoil, particularly sodium, produced high alkalinity and very poor physical condition. When dry, slick spots become very hard and resist water penetration, but when thoroly soaked, they offer little resistance to pressure. Many bad mud holes in roads develop on slick spots.

Use and Management Suggestions.—The productivity of the untreated Cisne silt loam is so low as to make grain farming on it very discouraging. Yields on the untreated plots at the Dubois experiment field, which was located on this soil, averaged about 5 bushels of wheat, 10 bushels of oats, and 10 bushels of corn per acre per year. Nearly every other year the crops were almost a total failure. Because of the extremely low natural productive capacity of this soil and the practical impossibility of securing adequate drainage it is questionable just how far to proceed with treatments aimed at increasing productivity. Growing redtop for seed has been the most profitable practice on this soil during the past few years. The possibility of utilizing this type for pasture should be given attention; utilization for that purpose appears more promising than general farming.

A method occasionally used to obtain better drainage on this soil is to plow each field in lands with the dead furrows about 4 rods apart. This practice is continued until there is sufficient slope to drain the water into the dead furrows. The chief difficulty encountered in following this plan is to secure sufficient slope in the dead furrows for the water to drain off. The experiment of plowing 1-rod lands toward the center is being tried as a means of further increasing the drainage. This method eliminates one-third of the acreage from cropping, but it is hoped that the increase in production on the remaining two-thirds will more than

compensate for the loss. The dead furrows are used as surface ditches, and the soil is mounded up 10 to 12 inches high between them, thereby increasing the thickness of the rooting zone.

This soil is low in organic matter and nitrogen and is strongly acid. Liming has proved to be the basic treatment. The first thing to do, therefore, after drainage has been provided is to test each field as suggested in Circular 346 and apply lime as needed. Sweet clover should then be grown and plowed down, together with all available animal manure. This practice will bring the soil to the point where it may be expected to produce an average of about 15 bushels of wheat, 30 bushels of oats, and 20 bushels of corn an acre a year, as indicated by yields from experiment fields in the southern part of the state. Further results on these experiment fields fail to indicate that any profit can be expected from phosphorus or potassium applications, altho crop yields will be increased to some extent by their use.

Fordyce silt loam (163)

Fordyce silt loam occurs in the Mississippi bottom in depressed or basin-like areas. These depressions were formerly shallow lakes and many of them are still without outlets. This type occupies about 6 square miles, or 1 percent of the total county area.

The surface soil contains a large percentage of undecomposed organic matter, has a loose structure, and is grayish to brownish drab in color. It varies from 6 to 14 inches in thickness. The surface material rests on a light drabbish gray, plastic clay heavily spotted with reddish brown.

Use and Management Suggestions.—Because of poor drainage about the only crop grown on this soil is corn. In rainy seasons water stands too late to permit the planting of any kind of crop. The water table stands at 20 to 24 inches below the surface during most seasons. No treatment to increase production is recommended, because of poor drainage. The water table could be lowered by constructing dredge ditches, but this would involve a large cost. Such projects should be carefully investigated as to probable returns on the investment before they are undertaken.

River sand (92)

River sand is mapped between the levee and the Mississippi river channel. It is made up of sand, varying from fine to coarse, that has been deposited recently. It is subject to overflow whenever the channel becomes filled. The best use of this land probably is the production of timber; cropping it is of very uncertain benefit. For suggestions for the planting of river sand to timber, write the Agricultural Experiment Station, Urbana, Illinois.

Ebbert silt loam (48)

Ebbert silt loam is mapped on depressed areas that are now, or were formerly, swampy or actually covered with water. It occurs along Big Muddy river and its tributaries and also in the Mississippi bottom. It occupies only about three square miles.

The surface soil is a friable, grayish drab silt loam varying from 7 to 10 inches in thickness. The subsurface is lighter in color and spotted with yellow. The

subsoil begins at 18 to 24 inches and is a medium-compact and plastic silty clay loam, gray in color spotted with yellow. Below 38 to 40 inches the material becomes more friable.

Use and Management Suggestions.—This soil can be made moderately productive by proper treatment. Drainage must be taken care of by establishing an outlet for surface ditches, and then the area should be thoroly ditched. The soil is sour but does not need so much lime to grow sweet clover as do most soils in the county. It is suggested that each field be tested, as explained in Circular 346. After the soil has been limed, sweet clover should be grown and turned under. Further treatments, other than adding all available animal manure, should be on a trial basis. This soil when treated is adapted to the growing of the grain crops common to the region.

Riley sandy loam (38)

Riley sandy loam occurs on old sand bars 4 to 10 feet above the surrounding land, adjacent to sloughs, old river channels, or lakes in the Mississippi bottom. It occupies only 1.68 square miles.

The surface soil is a yellowish brown, loose, medium-sandy loam 3 to 5 inches thick. The subsurface is a yellow fine sandy loam mixed with some silt and clay. The subsoil is not well developed, owing to the youth of the deposited material. At 15 to 20 inches the material changes to an open, grayish yellow sandy loam.

Use and Management Suggestions. — Riley sandy loam is naturally well drained and contains enough fine material so that it is not drouthy. It is neutral in reaction and will grow alfalfa and sweet clover without the addition of limestone. No treatment is suggested other than the regular addition of animal manure, green manuring crops, and crop residues to maintain the organic-matter and nitrogen contents. This soil is adapted to general farm crops, particularly small grains, legumes, and vegetables.

Worthen fine sandy loam (37)

Worthen fine sandy loam is mapped in the Mississippi bottom; the largest area is to the east of Fountain Bluff. This soil was derived from wash carried into the bottom from the surrounding upland and deposited there long enough ago so that a dark-colored surface soil has developed. It is similar to Drury fine sandy loam but has been in place long enough to have developed a darker surface soil. It occupies only 1.61 square miles.

Use and Management Suggestions.—The reader is referred to the recommendations given for Drury fine sandy loam (page 26) for suggestions on the use and management of this type.

Talbot sandy loam (31)

Talbot sandy loam occurs in the Mississippi bottom on ridges 15 to 35 feet above the surrounding land. It occupies 2.17 square miles. The material from which this soil was developed was deposited by the river during high water and partially reworked by the wind.

The surface soil is a dark yellowish gray, medium to coarse sandy loam. The

subsurface is yellow. There is little or no subsoil development, but the material as deposited becomes more gray and coarser in texture with increasing depth.

Use and Management Suggestions.—The open, porous nature of this soil makes it subject to drouth in dry seasons. When the rainfall during the summer is well distributed, it produces a fair to good yield of the common grain crops. It is low in organic matter and is somewhat acid. Each field should be tested for its lime requirement, as suggested in Circular 346, and lime should be applied in sufficient amount to grow sweet clover. Plowing-under sweet clover will increase the organic matter content and the water-holding capacity of the soil, and, together with the regular application of animal manure, will make the soil moderately productive in all but dry seasons.

Rough stony land (9)

Rough stony land is mapped on steep slopes and, as the name implies, stones and rocks occur on the surface and in the soil. The land is too steep for cultivation. Some of the more nearly level areas can be used for pasture, but most of the type should be kept in timber, or if already cleared, should be reforested. This type occupies 5.85 square miles, or 1 percent of the total county area.

Sandstone outcrop (95); Limestone outcrop (94)

Sandstone and limestone outcrops are for the most part nearly vertical cliffs of exposed rock. They are nonagricultural.

CHEMICAL COMPOSITION OF JACKSON COUNTY SOILS

In the Illinois soil survey the major soil types are sampled and subjected to chemical investigations in order to obtain a better understanding of type differences in chemical characteristics and also to obtain a knowledge of the amounts of the important plant-food elements present. The samples taken to represent the types found in Jackson county were taken in sets of three to represent three different strata in the upper 40 inches of soil, as follows:

1. An upper stratum extending from the surface to a depth of 6⅔ inches. This stratum, over the surface of an acre of the common kinds of soil, includes approximately 2 million pounds of dry soil.

2. A middle stratum extending from 6⅔ to 20 inches and including approximately 4 million pounds of dry soil to the acre.

3. A lower stratum extending from 20 to 40 inches and including approximately 6 million pounds of dry soil to the acre.

These data are recorded in Tables 3, 4, and 5. For convenience in making application of the chemical analyses, the results are given in terms of pounds per acre. It is a simple matter to convert these figures to a percentage basis if one desires to consider the information in that form. In comparing the different strata, it must be kept in mind that the composition of each is based on different quantities of soil, as indicated above. The figures for the middle and lower strata must be divided by two and three respectively before being compared with each other or with the figures for the upper stratum.

TABLE 3.—PRINCIPAL JACKSON COUNTY SOILS: PLANT-FOOD ELEMENTS IN THE SURFACE SAMPLING STRATUM, ABOUT 0 TO 6⅔ INCHES

Average pounds per acre in 2 million pounds of soil

Type No.	Type name	Total organic carbon	Total nitrogen	Total phosphorus	Total sulfur	Total potassium	Total magnesium	Total calcium
14	Ava silt loam, mature phase	17 350	1 710	870	330	34 620	5 050	4 970
214	Ava silt loam, immature phase	18 170	1 710	770	...	33 980	4 570	4 910
160	Ava silt loam, youthful phase	16 060	1 610	890	450	36 000	5 720	6 970
143	Ava sandy loam	13 140	1 340	700	...	36 120	3 560	5 900
13	Bluford silt loam, mature phase	19 210	1 720	750	600	30 490	4 650	5 220
164	Bluford silt loam, immature phase	17 990	1 820	710	520	33 790	4 180	6 430
85	Jacob clay loam	35 660	3 070	1 300	420	32 520	11 600	5 890
84	Okaw silt loam	22 400	1 920	760	500	21 660	4 620	5 680
12	Wynoose silt loam, mature phase	19 670	1 810	870	...	26 350	4 990	4 710
108	Bonnie silt loam	23 300	2 170	1 000	490	31 870	5 590	6 550
75	Drury fine sandy loam	15 560	1 360	860	540	34 720	4 720	10 560
162	Gorham clay loam	72 500	7 300	1 360	...	42 940	20 460	13 600
161	Newart silt loam	54 180	5 300	2 000	...	42 500	17 960	17 580
32	De Soto fine sandy loam	14 740	1 460	560	...	32 300	3 180	7 280
3	Hoyleton silt loam	23 120	2 180	620	730	23 480	3 650	6 030
70	Beaucoup clay loam	40 380	3 570	1 540	...	36 410	12 570	14 370
2	Cisne silt loam	25 200	2 520	690	...	23 090	3 290	5 210
92	River sand	11 780	1 060	900	...	28 160	3 140	8 280
48	Ebbert silt loam	34 980	3 120	860	...	31 920	5 600	10 220
38	Riley saudy loam	32 940	2 880	1 560	...	40 240	11 840	14 640
37	Worthen fine sandy loam	28 820	2 480	1 180	...	36 540	4 580	12 300
31	Talbot sandy loam	23 370	2 010	1 500	...	34 780	10 960	20 300

The above data include analyses of samples taken from adjoining counties.

Chemical data are given for 22 of the 30 soil types identified in Jackson county and listed on the map. Some of those not represented in the table are rough, eroded areas, or areas which, for other reasons, are not of agricultural interest. Others are omitted from the table because they occupy only very small areas in the county.

TABLE 4.—PRINCIPAL JACKSON COUNTY SOILS: PLANT-FOOD ELEMENTS IN THE SUBSURFACE SAMPLING STRATUM, ABOUT 6⅔ TO 20 INCHES

Average pounds per acre in 4 million pounds of soil

Type No.	Type name	Total organic carbon	Total nitrogen	Total phosphorus	Total sulfur	Total potassium	Total magnesium	Total calcium
14	Ava silt loam, mature phase	13 660	1 700	1 820	580	72 620	15 540	8 460
214	Ava silt loam, immature phase	15 330	1 760	1 790	...	72 290	14 870	8 520
160	Ava silt loam, youthful phase	15 420	1 980	2 450	720	75 950	17 220	14 560
143	Ava sandy loam	12 600	1 320	1 640	...	75 720	10 240	11 240
13	Bluford silt loam	18 120	2 020	1 590	670	66 180	17 510	9 660
164	Bluford silt loam, immature phase	20 000	2 480	1 840	860	77 540	13 780	12 600
85	Jacob clay loam	34 850	3 860	1 560	800	63 190	38 150	10 650
84	Okaw silt loam	21 840	2 400	1 040	840	47 400	14 800	14 760
12	Wynoose silt loam, mature phase	13 890	1 650	1 450	...	57 240	13 190	7 850
108	Bonnie silt loam	21 890	2 190	1 640	710	64 020	10 670	11 570
75	Drury fine sandy loam	32 360	2 880	1 920	800	65 880	10 760	22 880
162	Gorham clay loam	76 760	7 160	1 760	...	86 040	.....	30 160
161	Newart silt loam	34 720	3 800	2 560	...	81 720	29 640	29 880
32	De Soto fine sandy loam	13 040	1 280	960	...	68 520	10 000	14 080
3	Hoyleton silt loam	32 140	2 930	1 300	1 030	49 760	14 120	10 580
70	Beaucoup clay loam	51 020	4 420	2 230	...	72 420	26 780	24 920
2	Cisne silt loam	27 300	3 030	1 520	...	49 790	11 090	9 780
92	River sand	9 120	840	1 360	...	58 160	5 920	16 200
48	Ebbert silt loam	36 560	3 360	1 160	...	62 880	15 480	13 560
38	Riley sandy loam	52 280	4 520	2 560	...	78 840	25 640	29 600
37	Worthen fine sandy loam	30 240	2 720	2 080	...	74 680	10 600	22 840
31	Talbot sandy loam	22 160	2 900	2 520	...	70 020	20 800	41 840

The above data include analyses of samples taken from adjoining counties.

TABLE 5.—PRINCIPAL JACKSON COUNTY SOILS: PLANT-FOOD ELEMENTS IN THE SUBSOIL SAMPLING STRATUM, ABOUT 20 TO 40 INCHES

Average pounds per acre in 6 million pounds of soil

Type No.	Type name	Total organic carbon	Total nitrogen	Total phosphorus	Total sulfur	Total potassium	Total magnesium	Total calcium
14	Ava silt loam, mature phase	16 890	2 120	3 190	790	109 070	33 310	16 250
214	Ava silt loam, immature phase	15 220	2 060	3 460	.....	109 220	34 620	14 420
160	Ava silt loam, youthful phase	16 620	2 270	4 130	990	114 290	34 270	24 220
143	Ava sandy loam	16 320	1 920	3 060	.....	109 800	25 260	22 980
13	Bluford silt loam, mature phase	17 530	2 260	3 260	860	98 770	37 050	17 520
164	Bluford silt loam, immature phase	19 860	2 790	3 930	1 170	111 330	32 250	18 240
85	Jacob clay loam	37 100	4 290	2 300	1 980	94 860	70 620	19 780
84	Okaw silt loam	31 980	3 360	1 920	840	68 640	43 920	27 420
12	Wynoose silt loam, mature phase	14 920	1 900	2 460	.....	89 570	34 440	16 220
108	Bonnie silt loam	18 000	2 250	2 360	1 140	96 670	17 840	15 110
75	Drury fine sandy loam	50 160	4 680	2 700	1 260	94 740	18 660	32 880
162	Gorham clay loam	51 420	5 280	5 220	.....	123 120	71 340	57 600
161	Newart silt loam	21 900	1 320	2 880	.....	108 110	24 900	43 140
32	De Soto fine sandy loam	16 500	1 860	2 460	.....	105 780	38 220	29 640
3	Hoyleton silt loam	27 820	2 660	3 080	1 180	89 350	37 090	28 190
70	Beaucoup clay loam	57 270	5 390	2 570	.....	106 190	51 020	35 420
2	Cisne silt loam	24 870	2 780	2 820	.....	89 670	31 500	21 720
92	River sand	13 680	1 260	2 040	.....	87 240	8 880	24 300
48	Ebbert silt loam	31 980	3 360	1 740	.....	102 120	37 500	30 780
38	Riley sandy loam	34 800	3 360	3 540	.....	107 100	34 740	48 600
37	Worthen fine sandy loam	28 440	2 460	3 420	.....	114 720	20 880	33 840
31	Talbot sandy loam	27 120	2 700	3 780	.....	108 180	21 120	44 190

The above data include analyses of samples taken from adjoining counties.

Soil Reports Published

1 Clay, 1911
2 Moultrie, 1911
3 Hardin, 1912
4 Sangamon, 1912
5 LaSalle, 1913
6 Knox, 1913
7 McDonough, 1913
8 Bond, 1913
9 Lake, 1915
10 McLean, 1915
11 Pike, 1915
12 Winnebago, 1916
13 Kankakee, 1916
14 Tazewell, 1916
15 Edgar, 1917
16 DuPage, 1917
17 Kane, 1917
18 Champaign, 1918
19 Peoria, 1921
20 Bureau, 1921
21 McHenry, 1921
22 Iroquois, 1922
23 DeKalb, 1922
24 Adams, 1922
25 Livingston, 1923
26 Grundy, 1924
27 Hancock, 1924
28 Mason, 1924
29 Mercer, 1925
30 Johnson, 1925
31 Rock Island, 1925
32 Randolph, 1925
33 Saline, 1926
34 Marion, 1926
35 Will, 1926
36 Woodford, 1927
37 Lee, 1927
38 Ogle, 1927
39 Logan, 1927
40 Whiteside, 1928
41 Henry, 1928
42 Morgan, 1928
43 Douglas, 1929
44 Coles, 1929
45 Macon, 1929
46 Edwards, 1930
47 Piatt, 1930
48 Effingham, 1931
49 Wayne, 1931
50 Macoupin, 1931
51 Fulton, 1931
52 Fayette, 1932
53 Calhoun, 1932
54 Ford, 1933
55 Jackson, 1933

Requests from libraries and other public agencies desiring to complete their files of these reports will be given special consideration.